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Research Note

RUST CANKERS ---- A THREAT TO CENTRAL OREGON LODGEPOLE PINE?

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Rust cankers on lodgepole pine were found to be both numerous and damaging during the course of a 1957-58 Oregon yield study.¹ Out of 1,644 felled trees, 733, or 44.6 percent, had one or more cankers on the bole. Incidence of rust was highest on the largest trees.

This tally of rust-infected trees was made as an incidental part of the yield study. Therefore, kinds of cankers were not recorded separately and samples were selected strictly on the basis of the yield study requirements. However, the large number of cankers found indicates their importance.

Damage caused includes outright killing of some infected trees, top killing (everything above the canker), and weakening the stem at the point of the canker. Thus, because of cankers, windbreak is increased and number of trees that can qualify for such relatively high-value products as poles or saw logs is reduced.

Western gall rust (fig. 1), caused by Peridermium harknessii,² was by far the most common kind of rust found. A diamond-shaped canker (fig. 2), caused by Cronartium stalactiforme,³ was encountered much less frequently. The difference was large and easily observable without a tally.

Trees examined were those felled for growth measurement purposes as a part of the previously mentioned yield study. Sampling objectives of the yield study were twofold:

1. To obtain a good geographical representation of lodgepole pine stands as they occur on pumice soils in central and south-central Oregon.
2. To sample, for each 10-year age span from 30 to 120 years, 10 stands representing the widest possible range in site quality.

² Peterson, Roger S. Western gall rust conkers in lodgepole pine. Jour. Forestry 59: 194-196, illus. 1961.

³ Mielke, James L. The rust fungus (Cronartium stalactiforme) in lodgepole pine. Jour. Forestry 54: 518-521, illus. 1956.

¹ Dahms, Walter G. Gross and net yield tables for lodgepole pine. Proc. NW. Forest & Range Expt. Sta. U.S. Forest Serv. Res. Paper PNW-8, 14 pp., illus. 1964.



Figure 1.--Western gall rust canker caused by Peridermium harknessii.

Plot locations were further limited to pure, even-aged stands with densities high enough to fully occupy the site but not so high that height growth of the tallest trees would be retarded. No plots were selected that suffered substantial mortality during the preceding 10 years. These stocking and mortality limitations could have eliminated some heavily infected stands.

Trees on a given plot were selected for felling strictly on the basis of diameter. The 10 largest trees were selected on all but 3 of the 89 plots used. Smaller trees were chosen in proportion to the number in each diameter class. Actual selections were made in a strictly mechanical manner from a diameter listing of trees without reference to any other tree characteristic.

Plots were one-tenth acre in size for stands younger than 50 years and one-fifth acre in older stands. Thus, largest trees were selected at the rate of 50 or 100 per acre, depending upon plot size.

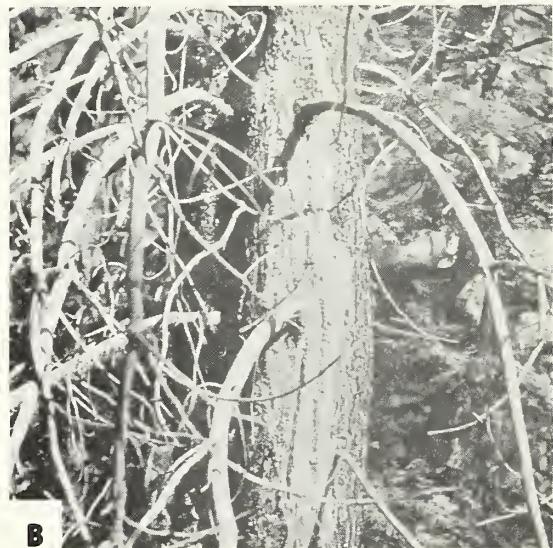


Figure 2.--A, Portion of a canker caused by Cronartium stalactiforme. Bark has sloughed off completely on the left and is alive only on the extreme right. The complete canker extends up on the bole several feet above d.b.h. and downward almost to the ground. B, This type of canker has a distinctive diamond shape.

Percent of rust-infected felled trees on individual plots ranged from 0 to 94 percent. All rust frequencies within this range were well represented. There was no correlation between stand age and percent of rust-infected trees.

Of 883 trees selected as largest on their respective plots, 437, or 49.5 percent,

were cankered (fig. 3). Of 761 trees not selected as largest, only 296, or 38.9 percent, were cankered. This difference in percentage of rust-infected trees between largest and other trees was highly significant statistically. It means that rust attacks occur more frequently on the larger, more vigorous trees than on the smaller, less vigorous ones.

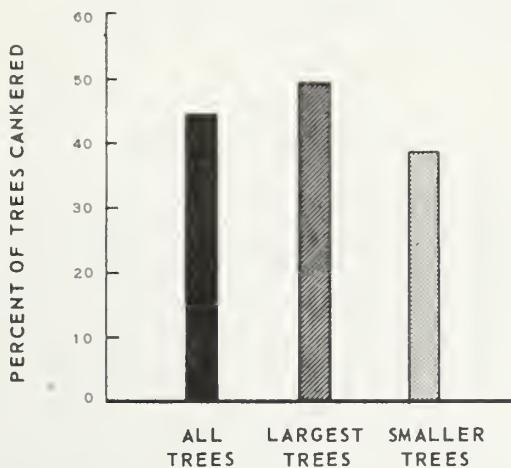


Figure 3.--Percentage of trees with cankers by tree-size class. Note: "Largest trees" are the 10 largest per plot; "smaller trees," all other trees.

